

MANUSCRIPTS AND ACTION ITEMS DISCUSSED AT THE GMI SCIENCE TEAM MEETING AT GREENBELT, MAY 2003

To facilitate discussion at the upcoming GMI meeting of Nov. 5-7, 2003, I have tried to distill manuscript plans and action items that were discussed at our last meeting. My understanding of the current status and/or comments are given in capital letters.

This is NOT meant to constrain the discussions at the upcoming meeting, but rather to provide some memory/continuity to our last meeting.

I. STRATOSPHERE

Manuscripts

- a) "Evaluating the credibility of transport processes in the Global Modeling Initiative 3D model simulations of ozone recovery" Strahan et al., SUBMITTED TO JGR.
- b) "Radicals and Reservoirs in the GMI Chemistry and Transport Model: Comparison to Measurements" Douglass et al., DRAFT TO BE CIRCULATED AT NOVEMBER MEETING.
- c) "Sensitivity of Antarctic ozone recovery predictions to GCM and DAS dynamics" Considine et al., DRAFT CIRCULATED TO CO-AUTHORS.

Action Items

a) Practical Transport Issues – transport as it functions in the CTM

- Understand differences between transport in GSFC CTM and GMI
- INCREDIBLY SIMPLE 4x5 compare to GMI at 4x5 same, same everything, and see what about things like
- KORD, JORD, version of TPCORE etc.; other options
- Implementation differences?
- Reprocessing of met fields?
- Other nagging issues we should think about before doing new runs
- Resolution – horizontal 2 x 2.5; 4 x 5?
- On-line tracers are available from FVGCM (CH₄, parameterized O₃)

How different from an off-line?

WORK HAS STARTED ON SOME OF THE ABOVE ISSUES

b) Hindcast

- (must follow resolution of some of the transport issues)

- Update to JPL-2002
- Mimic 2D hindcasts
 - Solar uv
 - Aerosols – 2D time dependent climatology
 - Boundary conditions for source gases
- Two years – “representative” warm NH year and cold NH year (bounds)
 - Let's check on these years a bit more thoroughly for their range so that we can justify the choice – we need dynamical blessings.
- 2D CTM also use circulation derived from the same 2 years and all the other inputs
- Tropospheric ozone
 - prescribed lifetimes (current GMI formulation)
 - Relax to climatology (suggestion)
- Output

STOLARSKI TO DISCUSS THE ABOVE AT THE NOVEMBER MEETING.

II. TROPOSPHERE

Manuscripts

- a) 1-2 manuscripts documenting GMI tropospheric model. Need further diagnostics, synthetic tracer runs (see below). USE CURRENT SIMULATIONS
- b) "Tropospheric NOx: How to Get the Fuzz Out" proposed by R. Chatfield
- c) IPCC-relevant manuscripts? WE NOT HAVE ANYTHING SPECIFIC FOR GAS-PHASE CHEMISTRY. CAN WE COME UP WITH SOMETHING?

TO BE DISCUSSED AT NOVEMBER MEETING.

Action Items

- A) Further diagnostics needed:
 - Monthly averages for reactions in model IMPLEMENTED, NEED POST-PROCESSOR.
 - Vertical advective fluxes IMPLEMENTED
 - Two-dimensional column tendencies IMPLEMENTED
 - Horizontal fluxes, three-dimensional tendencies NOT IMPLEMENTED
 - Define a model tropopause (not SYNOZ based) NOT IMPLEMENTED
- B) Comparison to GEOS-CHEM run (version used for OH comparisons)
 - LOGAN TO REPORT AT NOVEMBER MEETING?

C) Non-GMI run for GISS?

PRATHER TO REPORT AT NOVEMBER MEETING.

D) Boundary layer processes

Further analysis of Rn simulations SOME DISCUSSION AT NOVEMBER MEETING

Add diagnostic for mixing time in mixing layer NOT IMPLEMENTED

E) Impact of wet deposition on HNO_3 WET DEPOSITION WILL BE DISCUSSED AT MEETING.

F) Biases in NO_x , PAN. Do runs with reduced or not lightning source PROPOSED BY CHATFIELD, NOTHING DONE.

G) Examine NO_x along meridians??? I HONESTLY DO NOT REMEMBER THE DETAILS OF THIS

H) Synthetic tracer runs:

Fossil fuel CO_2 , CO; biomass burning CO; CH_3I . CALCULATIONS IN PROGRESS, WILL PROBABLY BE READY BY THE TIME OF THE NOVEMBER MEETING.

I) Simple e-folding loss in stratosphere IMPLEMENTED

J) Water vapor comparisons NOTHING DONE

K) Radiative forcing interface TO BE DISCUSSED BY WUEBBLES AT NOVEMBER MEETING

L) Expand database for model comparison NOTHING DONE, TO BE DISCUSSED AT NOVEMBER MEETING.

III. COUPLED STRATOSPHERIC-TROPOSPHERIC MODEL

A) Chemical mechanisms TO BE DISCUSSED AT NOVEMBER MEETING BY CONNELL, CONSIDINE

B) Establish strat-trop working group TO BE DONE AT NOVEMBER MEETING

C) Aircraft simulations TO BE DISCUSSED AT MEETING

D) Short-lived compounds

Required

- Combined model for strat/trop
- Tropospheric processes like wet deposition, convection, (no concern

- about degradation products to start with).
- Stratospheric chemistry to produce realistic Bry and Cly from traditional sources
- Tracer studies to evaluate transport -
 - Isentropic from TTL
 - Middleworld transport
 - STE
 - Radionuclides, CO₂,
 - short-lived non-methane hydrocarbon ethane (?),
 - CH₃I, Bromoform, CO (?)
- White paper in fall 04 (initial results summer 04)
- Time-line – workshop in spring 2005.

TO BE DISCUSSED IN NEW STRAT-TROP GROUP. IN PARTICULAR,
CAN WE DO IT IN THE TIME OUTLINED ABOVE?

IV. AEROSOLS/MICROPHYSICS

I HAVE MOSTLY PASTED FROM JOYCE'S SUMMARY LAST MEETING. WE
NEED TO PICK UP FROM HERE.

PROPOSED MANUSCRIPTS

- 1) Examine Sensitivity of aerosols to:
 - a) Examine scavenging schemes and in-cloud treatment of chemistry* 2 yrs to submission - post doc;...
 - b) changes to make things consistent with trop chem. In each met field* LLNL or GSFC if they are up to speed (easy); ...
 - c) with new met fields examine in-line dust/sea salt source* LLNL/ GSFC using modules we have (1 week to 1 month);
 - d) mixing in BL

*Software development
WE NEED TO FOCUS THE ABOVE MORE, WITH IPCC IN MIND.
- 2) Problem specific context: examine sensitivity to emissions sources (BC, DMS, SO₂)
- 3) Put in dynamic aerosol modules-software development time:

Each group needs time to make sure modules follow coding standards
Sulfate only (Kulmala scheme-Adams, 60 DOFs; – Debra 40 DOFs)
Michigan (all aerosol types-no nitrogen; 4 or up to 8 DOFs)

BNL (Vehkamaki; 6 DOFs/aerosol type; includes sulfate coagulation with other aerosol types)—moments need a fix to keep moments consistent after transport—requires BNL 6 months

Each Team providing a microphysical mechanism must run offline intercomparisons INTERCOMPARISON REQUIREMENTS TO BE POSTED ON THE WEB.

This problem may result in major changes to present and future forcing

Time line: If we're lucky – 4 months for 4 modules for core team plus 2 for adding sensitivity issues in (1) => mid 2005 for submission

4) Link with tropospheric chemistry model nitrate, ammonium with aerosol model—use Michigan/Nenes thermodynamic module—addresses integrated issues (changes in photolysis feeding back to the chemistry); but IPCC issue of forcing is not important.

Link current SO₄ model and solver with chemistry model – 1 month

Add ammonia sources to chemistry model-1 month

Add thermodynamic modules (2 months)

+6 months to submission??

Time line: July 2004 for submission

ARE WE GOING TO HAVE TIME FOR THIS?

5) Off line dynamic aerosol model intercomparison: ready to write now STATUS?

6) 2-D model intercomparison of aerosol dynamic model: Debra hopes to complete before 2005; Joyce and Debra should confer on development of COS sources for eventual implementation in 3-D model STATUS?

MISCELLANEOUS ITEMS BROUGHT UP BY DAN BERGMANN

Convection subcycles more than once/hour – changed back to larger value for subcycling WE HAVE NOT REALLY EXPLORED HOW MUCH OF A DIFFERENCE IT MAKES.

Wet scavenging – amount of condensed water in stratoform clouds changed to different value (Dan will communicate with D.J. and J.P.) TO BE DISCUSSED AT NOVEMBER MEETING

Michigan scavenging within PBL done differently than GMI method – JP will communicate with Cathy Chuang and resolve STATUS?

Emissions—uniform in PBL in Michigan code vs dramatic increase in Kzz (Cathy); vs trusting Kzz from code.—should be consistent with tropospheric code, but they can't decide what to do—JP will talk to Cathy; then Jose and choose method for now **STEERING COMMITTEE PROPOSED TO ADOPT INSTANTANEOUS MIXING, BUT IT HAS NOT BEEN IMPLEMENTED. NOTE THAT PREVIOUS IMPLEMENTATION OF INSTANTANEOUS MIXING DEGRADED THE AGREEMENT BETWEEN CALCULATED AND MEASURED CO AT SURFACE STATIONS.**

Dust emissions are offline every 6 hours—change to monthly average. -- new GEOS 3 data has soil moisture, but others do not; when we get new met fields we need soil moisture; **put in optional coding** (LLNL or GSFC)

Use monthly average soil moisture from GEOS 3 and winds from each met field (high priority to new met fields to do correctly!)—(will do if time)

Tune to get same dust burden?? (met data won't represent highest wind speeds)

STATUS?

Sea salt is now monthly average – 1st approach is to use these with all met fields;

Make consistent with met fields winds when update dust emissions
STATUS?

Chemistry: Plan for tropospheric group is to slowly kill tropospheric species when they enter stratosphere – needs to be done; follow method used for troposphere—kill off species and chemistry above 100 mb-use e-folding time (Debra will advise) **DONE**

O3, OH, HO2 – use switch; run with fixed species for all met fields (Dan's job) and with fixed species from each met field (later GSFC).—advice of tropospheric group on which fields to use **WE ARE STILL RUNNING WITH MICHINGAN INPUT.**

V. NUMERICAL ISSUES

NEW WORKING GROUP TO BE ESTABLISHED AT NOVEMBER MEETING (GUESS WHO IN CHARGE).

ITEMS THAT WERE PREVIOUSLY DISCUSSED:

- Convergence – are we working at resolution where numerical schemes are converging?

- Sensitivity to vertical resolution (we had some work on this before – minimum vertical resolution to resolve the processes we are trying to look at)
- Michael's issues with second order moments
- Interaction of transport scheme with chemistry solver
- Questions concerning flux limiters
- Questions concerning operator splitting

DO WE NEED TO WORRY ABOUT THE LATEST FLURRY OF EMAILS REGARDING THE DEPENDENCE OF CHEMICAL RESULTS ON NUMBER OF PROCESSORS UTILIZED, DUE TO THE STIFFNESS CRITERIA NOT BEING UNIFORM ACROSS PROCESSORS IN SMVGEAR? (I CAN PROVIDE RELEVANT EMAILS IF INTERESTED).

VI. AIRCRAFT (UEET) SIMULATIONS

Manuscripts

“Activities of NASA's Global Modeling Initiative (GMI) in the assessment of subsonic aircraft impact” Rodriguez et al. EXTENDED ABSTRACT SUBMITTED FOR THE PROCEEDINGS OF THE AAC CONFERENCE IN FRIEDRICHSHAFEN, JULY 2003.
SPECIAL ISSUE OF METEOROLOGISCHE ZEITSCHRIFTEN (PEER REVIEWED). EXPAND THIS ABSTRACT FOR PUBLICATION? DEADLINE IS DECEMBER 31.

Action Items

UEET aerosol simulations WILL BE DISCUSSED AT MEETING
2006 Final Assessment WILL BE DISCUSSED AT MEETING

WE WILL ESTABLISH AN AIRCRAFT WORKING GROUP.